National Aeronautics and Space Administration

Office of Space Science

SPACE SCIENCE ADVISORY COMMITTEE

July 29-31, 1998
NASA Headquarters
Washington, DC

MEETING REPORT

Jeffrey D. Rosendhal
Executive Secretary

Anneila I. Sargent
Chair

SPACE SCIENCE AND APPLICATIONS ADVISORY COMMITTEE
NASA Headquarters, MIC 6
July 29-31, 1998

MEETING REPORT
TABLE OF CONTENTS

Meeting Report Prepared By:
Paula Burnett Frankel, Consultant
Jorge Scientific Corporation

SPACE SCIENCE AND APPLICATIONS ADVISORY COMMITTEE
NASA Headquarters, MIC 6
July 29-31, 1998

Wednesday, July 29

Opening Remarks/Announcements
Dr. Anneila Sargent, Chair of the Space Science and Applications Advisory Committee (SScAC) called the meeting to order and welcomed members and attendees. She noted that this would be the last meeting for Dr. Wesley Huntress, Associate Administrator of the Office of Space Science (OSS), and expressed deep appreciation on behalf of the Committee for his efforts. This was also Dr. Sargent's last meeting as Chair of the SScAC, and Dr. Huntress and the members of the Committee acknowledged her contributions in this role.

OSS Program and Budget Status
Dr. Huntress discussed recent highlights, flight program status, the budget process, technology, and other activities underway in the OSS. NASA has selected eleven academic and research institutions as the initial members of the Agency's new Astrobiology Institute. Unfortunately, the Solar and Heliospheric Observatory (SOHO) spacecraft appears to have been lost, but there is some hope that it may be recovered when the solar panels become more fully illuminated. The Administrator has asked OSS to examine whether it would be possible to fly some of the spare SOHO instruments on the Triana spacecraft. The Transition Region and Coronal Explorer (TRACE), a complement to SOHO, was launched this year and is providing exciting images. Lunar Prospector continues to operate well. The Hubble Space Telescope (HST) continues to provide a steady stream of new results—recent examples include new images of gas streaming onto a black hole, and the possible detection of a planet-sized body being ejected from a binary star system. There is new evidence from Mars Global Surveyor (MGS) of the presence of flowing water on the surface of Mars for long periods of time. Since February, NASA has had headlines in major media publications as well as the science monthlies and weeklies. Mars has been a particular focus.

The launch schedule is very busy and will remain so for some time—there are about seven space science launches per year over the next several years. Beginning in September 1998, and going through March 1999, there will be one launch per month. The Advanced X-ray Astrophysics Facility (AXAF) will be ready for a December 2 launch, although it is currently manifested for January 1999. The third servicing mission for HST is manifested for March 1999, and OSS is currently considering Shuttle/Inertial Upper Stage (IUS) options for Europa and Pluto/Kuiper Express. Primary concerns about the programs being developed are the baseline lander mission for Mars 2001, the schedule for Gravity Probe (GP)-B, the schedule for Deep Space (DS)-2, German schedule issues on the Stratospheric Observatory for Infrared Astronomy (SOFIA), the launch schedule for AXAF, progress on Astro-E, and manifesting for the High Energy Transient Explorer (HETE)-2. There are also some concerns about the cost and schedule for the Thermosphere-Ionosphere-Mesosphere Energetics and Dynamics (TIMED) mission. The 2001 Mars Orbiter/Lander must accommodate the Human Exploration and Development of Space (HEDS) experiments, and OSS is examining how to do this in terms of both cost and the mass

constraints. OSS is also examining the possibility of flying the Marie Curie rover (the flight spare for the Pathfinder) on this mission. The Mars Exploration Strategy Group (MESG) has been established to review the architecture for the 2003 mission. Explorers are progressing well. Most of the issues concern getting the missions launched. The Discovery Program is also progressing well. Twenty-nine proposals have been received to date in response to the current Discovery Announcement of Opportunity (AO). ESA has decided to launch Planck with the Far Infrared-Submillimeter Space Telescope (FIRST), and is examining how to do this. The issue is whether there will be two separate spacecraft or one spacecraft.

The Agency is in the midst of preparing the FY 2000 budget. Dr. Huntress reminded the Committee that the FY 1999 budget request provides for continuation of International Solar Terrestrial Physics (ISTP) Program through solar maximum, continuation of the Solar Terrestrial Probe (STP) line, International Payloads, a Gamma ray Large Area Space Telescope (GLAST) start in 2002, and a technology line for the Constellation X-ray mission. Dr. Huntress reviewed the current Congressional status of the Agency's FY 1999 budget. The Senate provided an additional $50 million for NASA as a whole; the House provided an additional $44 million. Conference action is not expected until mid to late September. Specific instructions accompanied many of the Congressional changes. Although Congressional "earmarks" were accompanied by additional funding, OSS is still concerned about the number of these mandates. In particular, the $50 million in additional funding provided by the Senate does not cover the total number of earmarks in the Senate bill.

Dr. Huntress briefly discussed OSS performance metrics. Dr. Marc Allen discussed this subject at greater length later in the meeting. The OSS Plan is based upon twelve "near term" science goals in the Space Science Enterprise (SSE) Strategic Plan, and includes specific development and operations milestones for each year to measure progress. OSS has been working on an Integrated Technology Strategy, and will be producing the Plan this summer. It will be part of the SSE Strategic Plan. The OSS Technology Program is structured around a set of core programs, which are at the lower Technology Readiness Levels (TRLs) and include the cross-Enterprise Technology Development program, the Space Science Core program, the Focused Program (technology for specific missions), and the Flight Validation Program. NASA has a Congressional requirement to compete a substantial portion of Advanced Technology Development (ATD), and OSS plans to achieve 69% by FY 2000.

With respect to OSS recommendations from the last meeting, Dr. Huntress indicated that the Space Operations Management Office (SOMO), Grants Processing, and Astrobiology Initiative topics would be addressed in presentations later at this meeting. Dr. Huntress provided some advice for the future on how to make the strategic plan happen: enhance the science community role in defining mission content; maintain competition as the central principal in mission selection; continue to focus on science return; focus on lower cost missions and establish cost as the invariant project parameter; establish technology milestone prerequisites and a strong technology investment portfolio; seek international cooperation; engage the public; continue a high level of performance; strive for maximum appeal; and communicate effectively with the public.

Suggestions for Restructuring the Research and Analysis (R&A) Program

The current structure of the R&A program consists of about two dozen very discipline-specific items. In the process of moving toward more interdisciplinary themes and providing opportunities for research between traditional areas, there has been a question as to whether this structure was still appropriate. A variety of views have been expressed by the Science Directors regarding the desirability/need for restructuring the R&A Program. The range of possibilities suggested included: (1) issuing a single NASA Research Announcement (NRA) covering the entire R&A Program, with no preset decisions concerning allocation of funds; (2) having one NRA, with the budget divided into preset parts; (3) having one NRA with the budget divided into four parts, corresponding to some possible "super disciplines;" (4) having one NRA with the budget divided into four parts, corresponding to the current four science themes; and (5) no change from the present system. As an illustration, Dr. Huntress showed a potential "scheme 3" distribution of R&A funds among astrophysics/cosmology, astrochemistry/astrobiology, planetary systems science, and solar and space physics. Such a structure could give the Science Directors a greater visibility into the kinds of research being done, and allow an assessment of progress in those areas. The R&A Task Force is recommending continuing the current system of NRAs and discipline budgets, provided processes are instituted for periodic reallocation of funds among disciplines, and identification and support for new Strategic Research Initiatives. Detailed consideration of Dr. Huntress's suggestions was deferred until the Task Force Report was presented.

Astrobiology Institute Status Report

Dr. Harry McDonald, Director of Ames Research Center (ARC), discussed the status of the Astrobiology Institute, which is a key part of NASA's new Astrobiology Program. Recent discoveries have suggested a need for a new multidisciplinary approach. In order to invest in research, not infrastructure, it was decided to try the concept of a "virtual" institute. As noted earlier by Dr. Huntress, eleven member institutions were selected in response to the Astrobiology Institute NRA. The primary criteria for selection were innovation and a strong interdisciplinary character to the proposals. The Institute will have $9 million in funding for FY 1999, with up to $20 million per year for 2000 and beyond. There will be a future solicitation for additional members. Concomitant with the NRA, the search process for the Director was initiated, and is still underway. An interim institute management structure has been developed, headed by an interim Institute Manager. The Manager is involved in negotiation of agreements with selected institutions and is facilitating the introduction of advanced information technology into the operations of the Institute. In response to a concern expressed by Dr. Black regarding the appearance that the Institute is an entity under ARC, Dr. McDonald noted that the pros and cons of various management arrangements were discussed at Headquarters, and the Administrator decided that the reporting structure should be through ARC. The Institute Director will report to the Director of ARC, but will have a great deal of autonomy. The SScAC was concerned about the reporting structure, inasmuch as this could be a deterrent to obtaining a person of stature and world-class reputation for the Director's position. The SScAC was also concerned about what appeared to be the absence of an outside Board or oversight committee. Dr. McDonald noted that none of the international proposals received a high enough score to be included in the initial selection. However, international collaborative programs are being explored. ARC high performance computing and networking capabilities will be used in developing the virtual institute. The PIs are involved in the information technology activities. Dr. Squyres noted that collaborative communications tools developed/used in the Astrobiology

Institute could be applied elsewhere in the Space Science Enterprise. In response to a question, Dr. McDonald indicated that about 25% of the work of the Institute is focused on planetary formation (i.e., the "astro" part). In response to comments, Dr. McDonald stated that the number one priority is to appoint a Director for the Institute. In response to a question regarding the identification/use of emerging information technology, Dr. McDonald noted that the Institute will be used as a testbed for new technology. The tools should enable the science. Dr. McDonald noted that the roles of the Director are: to ensure that the operations of the Institute work; to be an advocate for the Institute; and to review and provide recommendations on integration of the science. Funding authority resides at Headquarters. The Director will play a major role in the selection process of future members and research. In response to a request by Dr. Sargent, the Director's job description was distributed to the Committee.

Government Performance and Results Act (GPRA) and the SSE FY 2000 Performance Plan

Dr. Allen discussed the overall requirements of the GPRA and the Space Science Enterprise (SSE) FY 2000 Performance Plan focusing on the science part of the plan. The Performance Plan is to be done on an annual basis, containing quantitative, outcome-oriented goals. The Agency has printed its Plan for FY 1999, and is now working on the Plan for 2000. The SSE Performance Plan must be organized to reflect the SSE and NASA Strategic Plans. Assessment in each of the four SSE mission areas should reflect the achievement across all elements of the SSE that contribute to those areas. In developing the FY 2000 Plan, OMB is requiring that the Performance Plan be organized along budget elements (e.g., development, operations, research, technology, and investment). This has been done in response to a Congressional concern that plans/performance metrics were not readily traceable to the budget. The OSS budget will be divided into three major areas: major programs and development; operations; and research and technology. The Flight Programs and Operations will be assessed on a blue-green-yellow-red system. Dr. Allen described a 2-step process of how the assessment, or "peer evaluation," would be done for the science components (R&A and Data Analysis): (1) self-assessment of programs by NASA; and (2) external independent validation. In the first step, programs would be aggregated based on the SSE strategic plan and the science goals, information would be collected from NRA documents and awards profiles, and highlights would be assessed and documented in a brief standard format. In the second step, ad hoc panels would be formed to receive the self-assessment documentation and briefings from NASA, and the panel would document its findings after questions and a closed door discussion. The Committee discussed the issue of conflict of interest on the external panel, and implications of high or low marks. Dr. Allen noted that some open questions concerning the development of the Performance Plan are: What are the consequences of "failure?" How high should the "bar" be set? How will the right balance between expertise and detachment on assessment panels be achieved? How will the various pieces of the research program be aggregated? What supporting data will be needed by panels? What will the political system do with these products? Dr. Allen showed some sample panel guidelines for making the assessments, and requested comment. The SScAC was impressed with the progress made in developing the assessment process, and endorsed the plan described by Dr. Allen. The Committee noted that it is important that a normalization function across panels be a part of the process so that the results are credible and mean the same thing across all of OSS.

Report: R&A and MO&DA Task Force

Dr. Black reported on the findings and recommendations of the R&A and Mission Operations and Data Analysis (MO&DA) Task Force. The charter of the Task Force was to assess the advantages and disadvantages of restructuring the Supporting Research and Technology (SR&T) elements across the themes, restructuring portions of the R&A program across discipline lines to create interdisciplinary activities within Code SR, and combining instrument development funds within Code SR into a single pool for all themes. At the first meeting in December 1997, the Task Force gathered information and shared views on the key issues. These issues were discussed and refined via email prior to the second meeting in May 1998. At the second meeting, the Task Force heard from all of the Board of Directors. Findings and recommendations were discussed and iterated electronically, and the final report prepared and distributed to SScAC members. The Task Force focused on three areas: restructuring the R&A Program to create interdisciplinary activities, data analysis, and instrument development funds. The current R&A program is rich with examples of interdisciplinary research, but little cross-theme research. There is no firm evidence that the current system stifles interdisciplinary proposals. None of the proposed restructuring suggestions by the Board of Directors (BoD), Dr. Huntress, or Dr. Brinton were endorsed by the Task Force.

The Task Force had the following specific recommendations:

- New Initiatives—A formal process should be defined by NASA for selection and funding of New Initiatives on an annual basis. These Initiatives should be of limited duration ($\leq$ 3 years). Funding should be at the level of a few percent of the total R&A budget (i.e., a few million dollars/year).
- Reorganization of the R&A Process—In order to assure evolution in the content of the R&A program, NASA should establish a process for reallocation of 10% of the total R&A budget every three years. A "Senior Review"-like process on the vitality of various discipline areas should be conducted to provide a basis for reallocation. The BoD would determine the reallocation on the basis of these reviews.
- Data Analysis—Planning and funding for Data Analysis (DA) and interpretation should begin earlier (e.g., Phases B and C) in mission development than has been typically the case. Increased DA support should also be provided through non-mission-specific scientific channels for projects that would utilize data from a single mission, several missions, or archives from old missions.
- Instrument Development Funding—There are no obvious advantages for either the community or NASA in establishing a single instrument development pot within Code SR. Coordinated and cooperative funding efforts between Codes SR and SM can be expanded; such expansion would be in the best interests of NASA and the community.

In summary, the Task Force found that the present system is not in need of major overhaul, but there are some areas where changes, as noted above, would be beneficial.

Overall, the SScAC felt that the Task Force findings were sound, and the recommendations represented a logical scheme. The SScAC agreed with the Task Force that the community review process in recommendation # 2 is a critical element. Additional discussion is needed on the best way to actually implement these recommendations, and a suggestion was made to involve the SScAC Subcommittees in developing an approach toward implementation. Dr. Pilcher felt that the report appeared to be too timid with respect to the changes to the current system. The

SScAC believed that the Task Force recommendations did not preclude bolder steps in cases where a clear need for such steps could be demonstrated. In the case of Data Analysis, the SScAC concurred with the Task Force findings and recommendations. With respect to instrument development, Dr. David Crisp noted that a closer collaboration is needed between technologists and scientists.

Education Program Update

Dr. Isabel Hawkins provided a view from the Education Forums, which were established to engage the OSS science community and tap the science knowledge and mission discoveries being made by each OSS theme for educational purposes. The primary functions of the Forums are to assess and respond to user needs, create an OSS-wide archive/catalog of Education/Public Outreach (EPO) products/programs, seek high-leverage opportunities through partnerships, coordinate efforts, and evaluate and disseminate the best practices. The Origins Forum is focusing on the archive/catalog activity, and is chairing a Working Group on this issue. This Forum is coordinating education efforts across individual Origins missions, and is working on the development of evaluation guidelines. The Structure and Evolution of the Universe (SEU) Forum is working on a Planetarium Show, a Web resource, student/scientist partnerships using online telescopes, and a national traveling museum exhibition. The Solar System Exploration (SSE) Forum is chairing the Ecosystem Reporting Working Group and is designing an integrated SSE Website. The Sun Earth Connections (SEC) Forum is chairing the Evaluation Working Group. It has established high-leveraged national partnerships with several organizations and curriculum developers, has been involved in GSFC teacher workshops through the Education Division, and has worked with the Exploratorium on a Solar Eclipse Webcast. Dr. Hawkins described some lessons learned by the Forums to date. The SScAC was impressed with the coordination among the themes, and felt that considerable progress has been made.

Dr. Black discussed the progress of the OSS Broker/Facilitators. The Broker/Facilitator component is well under way and is exceptionally diverse. The goal of the Broker Facilitators is to help space scientists and educators maximize the impact of their education and outreach efforts. Two key principles for leveraging these efforts are creating and supporting alliances among scientists and educators, and building on the successes of others. The Broker/Facilitators for the Western Region (Space Science Institute) have developed a Web presence to assist space scientists in getting started on EPO segments of their R&D proposals, and to assist key elements of the education community in connecting with the space science community. It has also been doing preliminary work on Guidelines for Space Scientists regarding educational technology, curriculum development, and involvement with science museums. The Lunar and Planetary Institute (LPI) Broker/Facilitator has been involved with the development of a planetarium show, and is developing a program through the State Library of Louisiana to distribute space science materials to underserved regions. While there are a number of key policy issues that remain to be clarified and resolved (e.g., conflict of interest situations, and guidance to proposers on evaluation criteria), again it was clear that considerable progress has been made.

Dr. Rosendhal concluded the Education and Outreach progress report to the SScAC. The Program is now in Phase IV (implementation). Over the next 18 to 24 months, the emphasis will be on integration of activities, evaluation, and working with other NASA Office and agencies. Dr. Rosendhal discussed the portfolio of activities within OSS Education and Outreach. The

Education Forums and Brokers are funded and in operation. Education/outreach language is now embedded in AOs and NRAs and the Langley Research Center (LaRC) process for reviewing and assessing proposals is in operation and maturing. There is strong interaction with NASA's Education Office and the Office of Equal Opportunity Programs. An OSS Education/Outreach Council has been established, and an external evaluator has been selected.

Science Operations Management Office (SOMO) Status

Dr. Guenter Riegler provided an update on space science MO&DA issues, and the status of SOMO. He noted that there will be an Astrophysics Senior Review this summer, and a SSE senior review in 1999. A total of $20 million will be transferred from Explorer development to MO&DA to address some critical funding shortfalls. For FY 1999, $50 million was cut from the SOMO budget based upon an anticipated savings created by consolidating operations in the Consolidated Space Operations Contract (CSOC). However, CSOC will not actually produce any cost savings in FY1999, thereby creating the prospect of real funding cuts in a number of areas. OSS is looking at the impact of these reductions and is particularly concerned about the proposed $25 million reduction to the distributed ground mission and internet information networks (NISN), and the proposed $12 million reduction to the Jet Propulsion Laboratory Program (primarily the Deep Space Network). All of the Enterprises will participate in a "scrubbing" of NISN services. Another area of concern is the Science Information Services (SIS) study and the proposed consolidation of all science data processing. OSS does not believe that major savings will be realized through such a consolidation. SOMO is proposing that the Enterprises put 10% of their SIS funding into a pool to fund a 5-year improvement program. OSS has rejected this proposal, and the issue is still unresolved. A draft policy statement is being prepared on the role of SOMO in Enterprise mission selections. SOMO believes they should participate in the development of those portions of AOs which describe operations services available from SOMO, and that technical experts from SOMO organizations at NASA centers should serve on appropriate technical proposal evaluation panels. In response to a question, Dr. Riegler noted that the major issue at this time is budgetary. SOMO cannot resolve the $50 reduction without impacts to the Enterprises.

Thursday, July 30

Subcommittee/Theme Reports

Structure and Evolution of the Universe

Dr. Paul Hertz reported on the SEU theme for Dr. Alan Bunner, who was unable to attend the meeting. Since the last meeting, the new decadal survey has been started, AXAF has completed thermal/vacuum test and is targeted for a December 3 launch, the "Name AXAF" contest has been held with announcement scheduled for September 1, ESA has selected the carrier option for Planck and FIRST, and the technology contracts for near term missions (FIRST, GLAST, and Constellation) have been awarded. There have been workshops on Space Inflatables and the Laser Interferometer Space Antenna (LISA), and ESA is progressing on LISA technology. Two Explorer processes are on-going—University Explorer (UNEX) science reviews have been completed and selection is scheduled before September 25; proposals on Mid-class Explorers (MIDEX) are due August 21, and the Stage 1 selections are scheduled for late December. This

year, the MIDEX AO includes an opportunity for Category 1 and Category III investigations that are not selected to receive funding for instrument development. Major issues are: near-term technology funding to enable planned near-future missions; a funding route for the Advanced Cosmic-ray Composition Experiment on the Space Station (ACCESS), and the continuing lack of adequate DA funding (Compton Gamma Ray Observatory, Rossi X-ray Timing Explorer, Advanced Satellite for Cosmology and Astrophysics (ASCA), Roentgen Satellite, Extreme UltraViolet Explorer, and Halca are all underfunded). The SEU/OS Senior Review this summer will address the DA issue.

Dr. Roger Blandford reported on the last SEUS meeting, which was held June 30-July 1, 1998. There was a very successful one day session on the SEU theme at the American Astronomical Society (AAS) meeting in San Diego in June. With respect to public outreach, one of the major initiatives is to write a version of the roadmap directed at the Congress and the public. The three themes of SEU are expressed as: (1) Beyond the Big Bang; (2) Voyage to a Black Hole; and (3) Extremes of Matter. The SEU Website can be found at http://universe.gsfc.nasa.gov. Recent science highlights include identification of gamma ray burst sources GRB 971214 and GRB 980425, the discovery of an X-ray pulsar (N157B) in an old supernova remnant, and the discovery of a slow X-ray pulsar. The implications of those discoveries were discussed.

Solar System Exploration

Dr. Carl Pilcher provided an overview of the science results from the SSE theme. From Lunar Prospector, there is increasing evidence of water ice deposits at the poles of the moon. There have been spectacular results from MGS. The northern lowlands of Mars are the flattest large-scale topography yet measured in the solar system, and are probably depositional in origin. The troughs and chasms in the polar cap indicate active or recent ablation. Coarse grain hematite was detected near Airy Crater, suggesting an area of previous aqueous processes. The MGS camera continues to see exposed layering in the walls of canyons. This could be volcanic or depositional. Specific investigations will answer questions regarding the type of layering. One of the most remarkable recent discoveries has come from the Galileo mission. The existence of a constantly changing magnetic field around a satellite indicates the generation of an induced field as a result of the passage of a conductor through the Jovian magnetic field. Such induced magnetic fields have now been detected associated with both Europa and Calisto. The presence of a salty ocean on Europa could explain this behavior. Calisto had been thought to be an undifferentiated body, and these findings raise fundamental questions on the formation of Calisto and the nature of its internal structure. One of the key questions about Europa is what is on the surface besides water ice. The Near Infrared Mapping Spectrometer (NIMS) is beginning to provide some answers (evaporite salts and hydrated minerals).

Dr. Pilcher also provided a status report on programmatic developments. A re-evaluation of the Mars Program architecture is on-going. Dr. Charles Elachi is leading this task—to develop an architecture for the next decade that will achieve advances toward understanding the biological history of Mars, prepare the technological and scientific groundwork for Mars exploration in the following decade, and identify scientific investigations which are enabled or are significantly enhanced by human presence. A fundamental element of the architecture is to lay the groundwork for a family of sample returns, with the first targeted for the 2005 launch. An emerging partnership with CNES could provide an Ariane 5 launch and a possible orbiter for the

2005 sample return mission. The Athena payload will be used for selecting samples. Dr. Pilcher described the features of the desired architecture and the schedule for the draft architecture and implementation plan. With respect to the Outer Planets Program, SSE is planning to issue a joint AO to solicit investigations for all three of the first missions—Europa Orbiter, Pluto/Kuiper Express, and Solar Probe—with staggered proposal deadlines and selection dates. A key issue is the launchers for Europa Orbiter and Pluto/Kuiper Express (the desired launchers are Shuttle/IUS).

Dr. Squyres discussed the recommendations from the SSES meeting in June. The SSES had concerns that the Mars Program goals may still exceed resources. The Subcommittee concurred with the MESG recommended payload for the 2001 lander mission, and recommended addition of precision landing capability. The SSES suggested that any possible 2001 augmentations go toward improving the lander mission's capability to do *in situ* studies. The Mars Program changes since the recent Congressional actions are consistent with the SSES recommendations. Dr. McCleese added that international collaborations are an essential component of the Program, and must be wholly integrated. With respect to the New Millennium Program (NMP), the SSES recommended that all selections be characterized by open communications, competition, and rigorous peer review. Dr. Sargent noted that a briefing on the status of the NMP should be planned for the next SScAC meeting. The SSES felt that the space science community would benefit from information from NASA concerning the state of validation of potential technology for use in programs like Discovery. The SScAC recognized that this is an important issue. Dr. Squyres indicated that NASA plans to follow previous SSES and SECAS recommendations regarding release of AOs for the three Outer Planets missions. The SSES emphasized the importance of time between release of draft and final AOs to allow sufficient time for community input. The SSES is beginning work aimed at supporting the next Space Science Enterprise strategic planning cycle. Initial work will be performed by SSES ad hoc Campaign Strategy Working Groups (CSWGs). Dr. Squyres described the CSWG tasks for the next six to eight months. The SSES will critically examine, prioritize, and integrate the CSWG inputs, leading to the SSES contribution to the next strategic plan.

Astronomical Search for Origins

Dr. Ed Weiler discussed the status of the Origins theme and upcoming highlights. The NICMOS Hubble Deep Field is planned for release in late summer 1998. The Wide Field Infrared Explorer (WIRE) launch is planned for mid to late September 1998. The HST 486 computer and the NICMOS cryocooler will have a test flight on STS in October. The final results from the four-year program to measure the Hubble constant will be released in the fall 1998. The Far Ultraviolet Spectroscopic Explorer (FUSE) is scheduled for launch in February 1999. Preparation is continuing for the third HST servicing mission in 2000. The process of obtaining construction permits is proceeding for the outriggers for the Keck Interferometer. The Space Infrared Telescope Facility (SIRTF) entered Phase C in April 1998, and monthly meetings are now being held between the SIRTF Science Center and the instrument teams. The project Critical Design Review (CDR) is scheduled for September 1998. Dr. Weiler discussed the new Origins missions—the Space Interferometry Mission (SIM), the Next Generation Space Telescope (NGST), and the Terrestrial Planet Finder (TPF). On SIM, the industry partner(s) will be selected during Phase A. An NRA for the SIM Science Team will be released this winter. With respect to NGST, a number of areas for technology cooperation/coinvestment with DOD

have been identified. A Preliminary Non-Advocate Review (PNAR) of the science program and instrumentation will be held in the fall. Three NGST studies are underway in Europe, and a letter of intent concerning possible international cooperation is expected to be signed this year. Strong interest in NGST has also been expressed by the Canadian science and aerospace community. One of the major budget issues is the effect of an AXAF slip on HST. The AXAF slip can be covered by HST reserves, but the funding transfer (~$20 million) will need to be repaid to HST in the 2003 timeframe. In the FY 98 budget, the Senate added an earmark for interferometric technology (through the University of Arizona) and Gemini (AURA). The President exercised the line item veto on this item, but the use of the line item veto was later held to be unconstitutional. OMB has informed NASA that the $10 million is available for use as specified in the report accompanying the FY 1998 appropriation. NASA would like to release an NRA for ground interferometric technology that would serve the flight missions (e.g., SIM). It is the best way to utilize this money, but it is not clear that Congress would allow such an approach to be taken.

Dr. Black reported on the last two meetings of the Origins Subcommittee (OS) in February and late June. At the February meeting, the OS discussed the need for a Science Operations Center (SOC) for NGST early in the program, and endorsed the development of WFPC-3 as a back-up capability for HST. Since then, the Space Telescope Science Institute (STScI) has been named as the NGST SOC. The OS raised concerns about the SIRTF Legacy Program starting too late relative to launch, as well as the balance between Legacy and the General Observer programs, and the proprietary period for Legacy teams. These are still open issues, and will be revisited at future meetings. At the June meeting, the concerns on the phasing of the Legacy program continued, and the OS will hear a report from Dr. Gehrz's group at the next meeting. The data management plan for SOFIA was raised as an issue, and an update was requested at a future meeting. The OS was concerned about signs of "requirement creep" on NGST. Dr. Sargent suggested that SScAC members and Subcommittee members take the message back to their communities regarding this issue. Another set of issues emerged at the last OS meeting concerning technology funds. The OS was concerned that the shift toward lower TRLs could lead to gaps in the continuum of development at various TRLs. The OS was also concerned that the current plan to "tax" existing programs to fund cross-Enterprise technologies could harm existing programs in key areas. An abrupt shift of technology responsibility (but not funds) to projects (e.g., NGST) could cause short-term budget problems for these projects. The OS was concerned about the delay in selection of a Director for the Astrobiology Institute. The OS was asked to assess a possible joint Keck/ Infrared Telescope Facility (IRTF) Mission Operations Working Group (MOWG). This assessment will involve the SSES. The OS was also asked to look at the process for selecting Space Science Updates.

Sun Earth Connection

Dr. Andrew Christensen reported on the last SECAS meeting in April. One of the recent developments for SEC has been the inclusion of a line for STP (Solar B, followed by the Solar Terrestrial Relations Observatory). The SECAS felt that successful implementation of the STP missions will require program leadership, sustainable launch intervals, and funding for technology development. The SECAS has developed recommendations on these subjects. The SECAS discussed Solar Probe, and emphasized the importance of funding technology

development for this challenging mission. The SECAS also discussed what NASA's role and SEC's role should be in Space Weather. The Subcommittee recommended that NASA form an internal NASA-wide task group to define the scope and potential contributions to the National Space Weather program. With respect to the grants process, the SECAS recommended that the study be expanded to include the handling of AOs and other contracts. The Subcommittee was concerned about the magnitude of the workload associated with the proposal review process, and the impact of the workload on the staff at Headquarters.

Dr. George Withbroe reported on highlights from the SEC theme. TRACE was launched in April 1998, and Dr. Withbroe showed some images that have been received thus far. A supersonic coronal shock wave crossing the Sun was detected by SOHO. All indications are the SOHO is still rotating at 1 rpm, and there is some chance that SOHO can be recovered when it reaches maximum power. An AO has been released for a minimum Triana mission to take real-time images of the Earth from L-1. OSS has been directed to look at the Triana mission as an opportunity for recovering SOHO science should such a step be necessary. The goal is to launch the mission before the end of 2000 (early in solar maximum). The SOHO experiments on Triana would have implications for global change, commercial use of space, electric power grids, high altitude air flight, national defense, and HEDS. The SEC challenge is to come up with funding (primarily in 1999 and 2000) for such experiments on Triana. Dr. Withbroe commented on a successful interdisciplinary program—the initiative on Solar Influences on Global Change. Proposals selected covered a broad spectrum. He noted that forming a multidisciplinary review panel was a challenge. There were a small number of highly innovative multidisciplinary proposals, and nineteen proposals were funded. There will be a workshop in about a year to report results. Dr. Mellot commented that there was a day's session at the last AGU meeting on "icy comets" in the atmosphere. After a thorough discussion, the general consensus was that the theory of comets dropping large amounts of water into the atmosphere is questionable.

Technology Showcase

During lunch, two technologists, Dr. Murzy Jhabvala from GSFC and Dr. James Lesh from JPL provided an overview of technologies in two areas. Dr. Jhabvala discussed detector technologies for NASA missions that have flown, and those for planned missions. Dr. Jhabvala described the characteristics of several types of detectors, and circulated samples for examination by the SScAC members. NASA missions are critically dependent on near Infrared (IR) detectors, and there are only a few commercial sources (NASA and DOD are primary customers). NASA is a relatively small, unique customer and detector houses are vanishing. JPL and GSFC have internal fabrication capabilities, but still require industrial partnering. When technology is appropriate, NASA needs to make a concerted effort to insert technologies into the commercial sector. Dr. Lesh discussed the emerging technologies in optical communications. A number of OSS missions would greatly benefit from this technology. It would permit a significant (10 to 100 x) increase in science data return capability. It also enables high data rates for HEDS missions and provides support for high data rate Earth-orbiters. Dr. Lesh discussed some common concerns and misconceptions about optical communications, and the implementation solutions. Optical communications can enable virtual presence throughout the solar system. The first demonstrations of this technology (the Optical Communications Demonstrator) will be in Earth orbit. Work has also begun on an optical communications subsystem for an outer planetary mission. A roadmap is in place for how this optical communications technology could

be implemented. In response to a question, Dr. Lesh indicated that SOMO is one of the funding sources for the program.

Research Program Update

Dr. George Withbroe noted that the most significant issue coming out of recent performance reviews was staff overload. Much of the load is associated with the review process for AOs and NRAs. One of the consequences of going to small missions is many more selections, leading to more work. Discussion are underway on how to solve this problem. A group will be established to address the problem from a systems perspective. Another issue is how to deal with the workload problem in the community (proposals and progress reports). Dr. Withbroe requested ideas and suggestions from the SScAC members. Another concern is the working environment at Headquarters, which will make it more difficult to recruit well-qualified scientists. In addition, the support infrastructure has diminished. The SScAC was concerned about this problem, and felt that something similar to the Kicza committee should be considered to address these issues.

Technology Program Status and Planning

Dr. Peter Ulrich provided an overview of technology highlights, and discussed the budget, technology investment, process update, planning activities, and the Space Studies Board (SSB) Task Group on Technology Development. Cross-cutting technology programs include formation flying, spacecraft batteries, MEMS chemical and biochemical analyzers, composite telescopes, space inflatables, satellite networks and architectures, automated planning and scheduling, micro IMU, and verification and validation. In FY 1999, technology investment is over 20% of the OSS budget. This does not include the mission-specific technology. Congress has mandated that 75% of the ATD work be competed, and progress is being made towards meeting this goal. The budget has been restructured into five elements: Advanced Concepts Program, Cross-Enterprise Technology Development Program, Space Science Core Program, Focused Programs, and Flight Validation Program. Effort at the lower TRLs (1-3) will be competed. A workshop with participants from NASA, academia, industry, and other government agencies was held to explore a number of critical issues concerning the planning and implementation of the OSS Technology Program. A set of fundamental policies for the Space Science Enterprise Technology Program has been developed. Policies can be found at: http://www.hq.nasa.gov/office/oss/osstech/policies.htm. Dr. Ulrich requested comments from the SScAC on the proposed policies.

The Division is currently working on an NRA for Cross-Enterprise Technology Development, and will focus on TRLs 1-3. It should be released mid-September 1998; selections will be made next spring. The Division has started a Mars Instrument Development Program (MIDP), and ten grants were awarded in May. This program will continue on 18 month centers, and the next solicitation will be in the Spring, 1999. In August, management of the Cross-Enterprise Program will move to the field centers. Dr. Ulrich described complementary programs for the visionary exploration of outer space. Critical technologies are needed to enable interstellar exploration—propulsion, communications, avionics, structures, power, autonomy, and navigation. A Technology Integration Plan has been completed, and will be circulated to the SScAC for review. Ten key capabilities for Space Science missions have been identified. There is a potential $20 million to be added to funds planned for broad competition. In a technology

driven program, mission plans must be consistent with technology funding and accomplishments. The Division has been reviewing mission plans over the summer, and this policy is being maintained.

Following an extensive discussion concerning the need for regular, organized external input into the technology planning process, Dr. Sargent suggested that a Technology Task Force under SScAC be formed, consisting of the technologists on the Committee and the Subcommittees (together with a small number of outside experts from NASA, industry, and the universities), to provide constructive advice on the program. She asked Dr. Ulrich to prepare a draft charter for this group, and for the Chairs of the Subcommittees to request participation on this Task Force from the technology representatives on the Subcommittees.

Grants Processing Implementation

Ms. Mary Kicza reviewed the process and summarized the recommendations which had been presented to the SScAC at its last meeting. She focused on activities since April. The full Team report and the approval package for the NASA Sponsored Research Business Office are being forwarded to the NASA Deputy Administrator. Approval is expected no later than August 18, 1998. Efforts to move toward a consolidated contract for peer review logistics support have been initiated, and the team is in place to develop the Request for Proposals.

Discussion with the NASA Administrator

Mr. Goldin indicated that he was very pleased with progress that has been made by the Space Science Enterprise. He noted that fundamental physics currently does not have a "home" within NASA, and indicated that he would like to integrate this discipline into the Space Science Enterprise. For example, the Space Test of the Equivalency Principle (STEP) program currently resides in the Office of Life and Microgravity Sciences and Applications, where it doesn't really belong. He has asked Dr. Huntress to set up a joint meeting between NASA, DOE and the high energy physics community to see how things could be done more synergistically, and there will be a joint conference with the high energy physics community next year. NASA needs to move more briskly in incorporating biology into its programs. Mr. Goldin noted that he felt that the Agency does not yet have the intellectual underpinnings for the Origins Program fully in place. However, the community has come together and has developed an integrated approach. With respect to the incorporation of new technology in missions, he has asked the Space Science Enterprise to establish criteria which must be passed in order to get approval for a program to proceed into development, e.g., what specific space experiments and studies must be done to start NGST. NASA needs to develop technology which looks beyond the next programs. The Agency cannot afford to stop work on technology while it goes into production phase for the next set of missions. The development of new technology must be an ongoing process.

Dr. Sargent raised the issue of the reporting structure of the Astrobiology Institute. Mr. Goldin noted that Headquarters should get out of the management business. He suggested an external Board of Directors/Trustees should oversee the Institute. Mr. Goldin was primarily concerned about not having an Institute which required a major investment in infrastructure. Rather, the Institute should be able to take advantage of existing capabilities. Ames has been chartered as the Center of Excellence for Information Technology, and will be highly motivated to provide

resources for the Institute. In order to do this, the Institute needs to have a close association with Ames. However, Mr. Goldin indicated that he would revisit the decision again with Dr. McDonald and the Space Science front office. Mr. Goldin also indicated that he felt that there was not enough biology in the first set of investigations which have been selected.

Dr. Sargent also brought up the issue of excessive workload, due to the downsizing of Headquarters and the increase in solicitations and proposal activity. Mr. Goldin noted that new techniques must be brought to bear to help alleviate the workload problem. He took an action to initiate an exercise comparable to the Grants Management Process Task Force to address the workload issues (primarily the mechanism of the proposal process). Mr. Goldin indicated that one of the highest priorities for this advisory committee should be to ensure that the Associate Administrator has the necessary review processes in place to ensure the integrity and success of all of the missions launched. He suggested that the SScAC have an in depth discussion on this subject with Dr. Huntress, and Dr. Sargent took this as an action for the Committee.

Committee Discussion
The Committee discussed the issue raised by Mr. Goldin regarding the review process needed to assure mission success. It was noted that the pre-launch review is the last point to identify problems before launch, and a suggestion was made to put more emphasis on the earlier reviews. The SScAC felt that there are an alarming number of yellow and reds on the mission "fever" chart presented by Dr. Huntress in his discussion of program status, and wondered whether this was an anomaly or an early warning of a more fundamental problem. The Committee posed the following questions: What is the review process leading up to launch? Does it work effectively? What are the steps that are in place to focus on the earlier stages? Can the SScAC help improve the process?

Friday, July 31

The Committee discussed the R&A MO&DA Task Force report, and endorsed the recommendations. The SScAC noted that the Task Force did not have time to fully explore implementation of the proposed changes, and recognized that there may be serious budget phasing implications which need to be analyzed in greater detail. It is important that community be a significant player in the reallocation process. The choice of the reviewers will be critical.

Discussion with the Associate Administrator
Dr. Sargent led the discussion with Dr. Huntress. She noted that the SScAC was very pleased with the number of launches and the exciting science results, and was very happy with Dr. Allen's work on the FY 2000 Performance Plan. The Committee was also pleased with the implementation of the Education Plan. With respect to the themes, SEU felt there should be continuing vigilance on technology funds. SSE seemed confident that the changes to the Mars Program were in the right direction. The SScAC appreciated that SSE is focusing on NMP, and there should be a presentation on the NMP at the next meeting. The most serious problems from the themes (particularly SEU and Origins) are the possible redistribution of responsibilities for technology (without accompanying funds), and the workload on the research program staff.

Dr. Sargent noted that Mr. Goldin visited the meeting on the previous day, and offered his thoughts on several topics. He was enthusiastic about fundamental physics, and suggested that it be included in Space Science. The SScAC was concerned about the mechanism by which this would be included, and would like to follow this issue closely. The SScAC expressed concern about the workload on the OSS research staff, and Mr. Goldin indicated that he would look into ways to streamline processes. While there are more launches, there are signs of increasing problems (as indicated by the yellows and reds in the status chart). Mr. Goldin had encouraged the SScAC to engage in discussions regarding whether OSS has the right processes in place to ensure mission success. Dr. Huntress indicated that Mr. Goldin had given him an action several weeks ago to look into this, and the office is pursuing it. The SScAC was disconcerted by the structure of the Astrobiology Institute (e.g., the Director of the Institute reporting to the Center Director of Ames), and felt that the independence of the Director from Ames is important. Mr. Goldin agreed that he would revisit this issue with Dr. McDonald. Dr. Huntress indicated that the problem of not enough biology investigations would be resolved in the future as the Institute evolves. The Institute will be a forcing function on the Information Technology program at ARC. Dr. Sargent requested that copies of Dr. Huntress' letter of direction to ARC Center Director regarding the Institute be provided to all of the SScAC members.

Dr. Sargent noted increasing concerns with the direction that SOMO seemed to be going, and that the SScAC was disappointed that a briefing from a SOMO representative was not made at this meeting. The SScAC insisted that a presentation from a SOMO executive be made at the next meeting. The SScAC will work with Dr. Riegler and Dr. Huckins to specify the topics and issues that the Committee would like addressed in that briefing.

With respect to the R&A Task Force, the SScAC endorsed the results of the study. The SScAC did not find any incompatibility between the findings of the Task Force and the suggestions presented by Dr. Huntress. The two sets of recommendations really address different aspects of the R&A Program. Any of the schemes could be used in conjunction with the recommendations of the Task Force. The SScAC is particularly concerned about appropriate inclusion of the community in the process of making changes to/reviewing various aspects of the R&A Program.

The SScAC was very impressed with the technology talks on detectors and optical communications. Similar presentations in the future would be welcome. The SScAC believes that Dr. Ulrich needs a Task Group to provide wider input from the community regarding technology development and where it should be going. The SScAC was concerned that the technologists on SScAC and the Subcommittees were not being involved to the degree that they should be. The Committee recommended that a Task Force be put in place with the active involvement of the technologists on SScAC and the Subcommittees, and requested a briefing on the proposed charter and membership of that Task Force at its next meeting.

There were concerns about cross-enterprise technology tasks, and a possible shift of technology development to the projects without a transfer of funds. An abrupt shift could seriously impact the projects; a more gradual transition is suggested. This issue needs to be better understood.

It was not clear to the SScAC how the competitions for technology funding are to be held. Dr. Huntress indicated that there will be an examination to ensure that the processes used by the Centers are open and fair. The NRC is currently looking at this area also. The SScAC was also concerned about the impact of the possible 10% "tax" for cross-cutting technology that Dr. Ulrich had mentioned, and Dr. Huntress indicated that this subject would be examined and discussed at a future SScAC meeting.

Before the meeting was adjourned, the Committee scheduled the next SScAC meeting for November 18-20, 1998 at NASA Headquarters, Washington, DC.

Space Science Advisory Committee Meeting
NASA Headquarters--MIC 6
July 29-31, 1998

Wednesday July 29		
8:30 AM	Opening Remarks/Announcements	Sargent
8:45	OSS Program and Budget Status	Huntress
9:45	Discussion	
10:15	BREAK	
10:30	Astrobiology Institute Status Report	McDonald
11:00	Discussion	
11:15	Science Metrics/FY 2000 Performance Plan	Allen
11:45	Discussion	
12:15 PM	Working Lunch	
1:15	Final Report: R&A and MO&DA Task Force	Black
1:45	Discussion	
2:15	Suggestions for Restructuring the R&A Program	Huntress
2:45	Discussion	
3:15	BREAK	
3:30	Education Program Update	
	- A View From the Education Forums	Hawkins
	- A View From the Brokers	Black
	- Summary	Rosendhal
4:00	Discussion	
4:15	Science Operations Management Office Status	Riegler
4:45	Discussion	
5:00	General Discussion	
5:45	ADJOURN	
6:30	Group Dinner--Le Rivage/1000 Water Street, SW	

Thursday July 30		
8:00 AM	Announcements	Sargent
8:15	Theme Status Reports/Reports from Subcommittees	
	- Structure & Evolution of the Universe	Hertz/Blandford
9:00	Discussion	
9:15	- Solar System Exploration	Pilcher/Squyres
10:00	Discussion	
10:15	BREAK	
10:30	- Astronomical Search for Origins	Weiler/Black
11:15	Discussion	
11:30	- Sun-Earth Connection	Withbroe/Christensen
12:15 PM	Discussion	
12:30	Lunch/"Technology Showcase"	Ulrich
1:30	Discussion with NASA Administrator	Goldin
2:00	Research Program Update	Withbroe

2:45	Discussion	
3:00	Technology Program Status and Planning	Ulrich
3:45	Discussion	
4:00	BREAK	
4:15	Grants Processing Implementation	Kicza
4:45	Discussion	
5:00	General Discussion/Recommendations	
6:00	ADJOURN	

Friday July 31

8:30 AM	Announcements	
8:45	Discussion/Formulate Recommendations	
11:30	Report to the AA for Space Science	Sargent
12:30 PM	ADJOURN	

SPACE SCIENCE ADVISORY COMMITTEE (SScAC) MEMBERSHIP

Dr. Anneila I. Sargent *(Chair)* (until 9/98)
Department of Astronomy
MS 105-24
California Institute of Technology
Pasadena, CA 91125
(626) 395-6622
FAX: (626) 568-9352
email: afs@phobos.caltech.edu

Ms. Christine M. Anderson
Director, Space Vehicles
Air Force Research Laboratory
3550 Aberdeen Avenue, SE
Kirtland AFB, NM 87117-5776
(505) 846-6243
FAX: (505) 846-6689
email: anderson@plk.af.mil

Dr. David C. Black
Director, Lunar and Planetary Institute
3600 Bay Area Boulevard
Houston, TX 77058
(281) 486-2138
FAX: (281) 486-2173
email: black@lpi.jsc.nasa.gov

Dr. Roger D. Blandford
California Institute of Technology
Theoretical Astrophysics
1200 E. California Boulevard
Mail Code 130-33
Pasadena, CA 91125
(626)395-4200
FAX: (626)796-5675
email: rdb@tapir.Caltech.EDU

Dr. Andrew B. Christensen
The Aerospace Corporation
P.O. Box 92957
Los Angeles, CA 90009
(310) 336-7084
FAX: (310) 336-1636
email: andrew.b.christensen@aero.org

Dr. David J. Des Marais
Senior Research Scientist
Exobiology Branch of the Space Science Division
NASA/Ames Research Center
Moffett Field, CA 94035-1000
(650) 604-3220
FAX: (650) 604-1088
email: ddesmarais@mail.arc.nasa.gov

Dr. Alan M. Dressler
Carnegie Observatories
Carnegie Institution of Washington
813 Santa Barbara Street
Pasadena, CA 91101-1292
(626) 304-0245
FAX: (626) 795-8136
email: dressler@ociw.edu

Dr. Robert D. Gehrz
Department of Astronomy
University of Minnesota
116 Church Street, SE
Minneapolis, MN 55455
(612) 624-7806
FAX: (612) 626-2029
email: gehrz@ast1.spa.umn.edu

Professor Daniel E. Hastings
Chief Scientist
US Air Force
Room 4E320
1075 Air Force Pentagon
Washington, DC 20030-1075
(703) 697-7842
FAX: (703) 697-5154
email: hastingsd@execnet.hq.af.mil

Dr. Isabel Hawkins
Space Sciences Laboratory, MC 7450
University of California Berkeley
2150 Kittredge Street
Berkeley, CA 94720-7450
(510) 643-5662
FAX: (510) 643-5660
email: isabelh@ssl.berkeley.edu

Dr. Klaus Keil
Director, Hawaii Institute of
Geophysics and Planetology
School of Ocean and Earth
Science and Technology
2525 Correa Road
University of Hawaii at Manoa
Honolulu, HI 96822
(808) 956-8760/61
FAX: (808) 956-3188
email: keil@kahana.pgd.hawaii.edu

Dr. Daniel J. McCleese
Caltech/Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91109
(818)354-2317
FAX: (818)393-6546
email: djmcc@scn1.jpl.nasa.gov

Dr. Norine E. Noonan
Vice President for Research and
Dean of the Graduate School
Florida Institute of Technology
150 W. University Boulevard
Melbourne, FL 32901
(407) 768-8000 ext. 8960
FAX: (407) 724-2481
email: noonan@zach.fit.edu

Dr. Jeffrey D. Rosendhal *(Executive Secretary)*
Assistant Associate Administrator for
Space Science (Education and Outreach)
NASA
Washington, DC 20546-0001
(202) 358-2470
FAX: (202) 358-3092
email: jrosendh@hq.nasa.gov

Dr. Steven W. Squyres
428 Sciences Building
Cornell University
Ithaca, NY 14853-6801
(607) 255-3508
FAX: (607) 255-5907
email: squyres@astrosun.tn.cornell.edu

Dr. C. Megan Urry
Head of Science Program Selection Office
Space Telescope Science Institute
3700 San Martin Drive
Baltimore, MD 21218
(410) 338-4593
FAX: (410) 338-4767
email: cmu@stsci.edu

Dr. Richard R. Vondrak
Chief, Laboratory for
Extraterrestrial Physics
Space Science Directorate
NASA/Goddard Space Flight Center
Greenbelt, MD 20771
(301) 286-8112
FAX (301) 286-1683
email: vondrak@lepvax.gsfc.nasa.gov

Space Science Advisory Committee Meeting
NASA Headquarters--MIC 6
July 29-31, 1998

MEETING ATTENDEES

Committee Members:

Sargent, Anneila *(Chair)*	California Institute of Technology
Anderson, Christine	Air Force Research Laboratory
Black, David	Lunar and Planetary Institute
Blandford, Roger	California Institute of Technology
Christensen, Andrew	The Aerospace Corporation
Dressler, Alan	Carnegie Observatories
Hawkins, Isabel	University of California, Berkeley
Hastings, Daniel	US Air Force
Keil, Klaus	University of Hawaii at Manoa
McCleese, Daniel	NASA/Jet Propulsion Laboratory
Noonan, Norine	Florida Institute of Technology
Rosendhal, Jeffrey *(Executive Secretary)*	NASA Headquarters
Squyres, Steven	Cornell University
Urry, C. Megan	Space Telescope Science Institute
Vondrak, Richard	NASA/GSFC

NASA Attendees:

Allen, Marc	NASA Headquarters
Avery, Barbara	NASA Headquarters
Cleave, Mary	NASA/GSFC
Crisp, David	NASA/JPL
Cunningham, Glenn	NASA/JPL
Dakon, Kathy	NASA Headquarters
Gillette, Marilynn	NASA Headquarters
Hagopian, Mike	NASA/GSFC
Hertz, Paul	NASA Headquarters
Holt, Steve	NASA/GSFC
Jenkins, Nancy	NASA Headquarters
Jhabvala, Murzy	NASA/GSFC
Kicza, Mary	NASA/GSFC
McDonald, Harry	NASA/ARC
Netting, Ruth	NASA Headquarters
Norris, Marian	NASA Headquarters
O'Toole, Rich	NASA/JPL
Six, Frank	NASA/MSFC
Sorrels, Carrie	NASA Headquarters
Varsi, G.	NASA/JPL

Whetsel, Charles	NASA/JPL
Woods, Dan	NASA Headquarters

Other Attendees:

Alexander, Joseph	NAS/SSB
Appleby, John	JHU/APL
Beres, Kathleen	Hughes
Domian, Brian	Contraves Brashear Systems
Hatch, Erin	NAS/SSB
Herman, Dan	[consultant]
Lancaster, Heather	SAIC
Lawler, Andrew	Science
Malay, Jon	Ball Aerospace
Martin, Frank	Lockheed Martin
Reese, Terry	Lockheed Martin
Silva, Richard	TRW
Snyder, Amy	NAS/SSB

SPACE SCIENCE ADVISORY COMMITTEE
NASA Headquarters
July 29-31, 1998

STATEMENT AND RECOMMENDATIONS

August 28, 1998

Dr. Wesley Huntress
Associate Administrator for Space Science
NASA Headquarters
300 E Street SW
Washington, DC 20546-0001

Dear Dr. Huntress:

The Space Science Advisory Committee (SScAC) met at NASA Headquarters on July 29, 30, and 31, 1998. It is a measure of your successful leadership of the Office of Space Science (OSS) that at each meeting the Committee has now come to expect a recitation of new and exciting scientific results from both you and the Theme Directors. We were certainly not disappointed on this occasion. We have already started out successfully on the path laid out in the OSS 1997 Strategic Plan, and Congressional budget actions to this point encourage us to believe that these goals will continue to be realized. SScAC is grateful for all the efforts you and your staff have made to ensure this. The increasing number of launches per year is also a cause for congratulations and for continuing high expectations for OSS.

Highlights of the meeting included fascinating lunch-time presentations by Dr. James Lesh and Dr. Mhurzy Jhabvala on aspects of current NASA technology efforts. Equally entertaining was Dr. Marc Allen's refreshing approach to the FY 2000 Government Performance Results Act (GPRA). It is a pleasure to endorse his report. It sets out ways to evaluate the strategic plan at least every 3 years, and provides annual performance reports based on metrics that are appropriate to such varied aspects as science missions, technology, and education and outreach. The SScAC agrees that the effectiveness of this activity will depend on OSS's ability to maintain a calibrated and objective grading scale that sets fair and realistic standards for success.

We also had an encouraging update on the OSS education and outreach effort. The Committee is pleased to see this OSS program becoming an effective tool for enhancing K-14 education and for communicating NASA science to the general public. We were particularly impressed by the clearly articulated plan to achieve high leverage and impact through partnerships with appropriate teacher and museum/planetarium organizations and by capitalizing on particular strengths of specific participants. The SScAC sees considerable value in close synergy between Forums and theme subcommittees, and urges them to establish a process for coordinating goals and activities.

And of course, we appreciated the visit from the NASA Administrator, Dan Goldin. We welcomed his insights into new directions for OSS, and his views on a number of topics that had been raised during our deliberations. One or two of these were issues that caused the Committee some concern. They are discussed in more detail below, as are other recommendations.

ASTROBIOLOGY

We were very interested in the presentation by Dr. Harry McDonald, Director of Ames Research Center, on the Astrobiology Institute. SScAC believes that the Institute, and the research it will enable, is of the utmost importance to NASA. We were particularly pleased to learn that the Institute now comprises eleven outstanding, multidisciplinary teams engaged in fundamental research on the origin and evolution of life.

We are less enthusiastic about the organizational aspects of the Astrobiology Institute as presented. It is essential that the Institute's independence from Ames management be unequivocal. In this regard, we regret both the ambiguity of the draft organizational structure and the proposal that the Director of the Astrobiology Institute report to the Center Director of Ames. We were pleased to learn during our discussions with Mr. Goldin that he intends to revisit these issues with Dr. McDonald and the Code S front office. We look forward to an update on this issue at our next meeting.

"FASTER, BETTER, CHEAPER"

The SScAC is excited about the increased number of missions in support of space science. The faster/better/cheaper concept appears to be working. Nevertheless, the increased workload could lead to greater mission risks. The Committee noted that a larger than usual fraction of the flight projects currently underway seem to be experiencing development difficulties of some sort. The very nature of the "faster, better, cheaper" philosophy mandates increased vigilance on the part of the Agency and the community over the status of projects in development. In order to increase the likelihood of mission success, we recommend that the Associate Administrator for Space Science ensure that there is independent scrutiny (either by the contractor, by the appropriate NASA Center, or by both in concert) from design through initial operations, commensurate with good engineering practice.

SPACE OPERATIONS MANAGEMENT OFFICE (SOMO)

Following our last meeting SScAC requested a detailed briefing from a SOMO executive to address, and to alleviate if possible, our concerns about this relatively new entity. In particular, we wanted to ensure that implementation of SOMO would not result in a reduction in space science productivity. That requested briefing has not yet taken place. The presentation by Guenter Riegler at this meeting served only to increase our great unease with the way in which SOMO implementation is proceeding. Already it appears that OSS has been insufficiently involved in SOMO decisions that increase the cost or decrease the productivity of science missions.

We insist that, at the upcoming SScAC meeting in November, a SOMO executive describes the decision-making processes, identifies the positive benefits for science, and explains the specific reasons for recent SOMO practices and actions that appear detrimental to OSS.

RESEARCH MANAGEMENT DIVISION

SScAC continues to be enormously impressed by the dedication and diligence of the Research Management Division staff who are charged with the formulation, review, selection and management of the science research program. Unfortunately, their responsibilities have grown substantially while there has been no significant increase in their numbers. The existing staff is, as a result, subject to ever-increasing stress that threatens to impede their ability to carry out these responsibilities successfully.

The Committee believes that changes are required. We have already commended the Kicza committee for the way in which it identified ways to improve the Grants processing activity. A similar approach might be applied to improve the proposal process. We were particularly pleased that Mr. Goldin agreed that this might be an appropriate action.

ADVANCED TECHNOLOGY AND MISSION STUDIES DIVISION

The Committee applauds the efforts of the ATMS Division towards enabling Space Science requirements and identifying associated technology deficiencies. However, we recognize that the Division Director needs a mechanism for regular input and feedback from the community. To accomplish this, we recommend that a Task Force with a well defined sunset clause be formed. The Task Force should include the designated technologists from each SScAC theme Subcommittee, the two technology members of the SScAC, and a small number of key NASA and outside technologists. This Task Force will be charged to review the NASA integrated technology planning process and provide recommendations, as required, to ensure mission success. The charter and proposed membership will be developed cooperatively by Division Director, Peter Ulrich, OSS staff, and SScAC. It will be presented to the SScAC for their comments and endorsement at the November meeting.

TASK FORCE ON R&A AND MO&DA

The Committee endorses the recommendations of the study conducted by SScAC's Task Force on R&A and MO&DA. If implemented, these would establish formal processes that should foster further innovation and cross-disciplinary activities in the R&A program. We believe that the active participation of the space science community in the recommended processes for funding of new initiatives and in the periodic reassessment of the vitality of the R&A program is essential.

It does not appear to SScAC that the Task Force report is incompatible with any of the suggestions you presented to us regarding the restructuring of research solicitations. In the near term, however, their recommendations might best be combined with one of your more structured schemes. Indeed, we realize significant issues are involved in actually implementing the recommendations. Any reallocation of R&A funds, for example, must be carefully phased to

minimize disruption of productive ongoing activities, and mechanisms for involving the scientific community in identifying and evaluating new initiatives must be established. SScAC would appreciate a response to the Task Force recommendations at our next meeting.

The fact that this was the last SScAC meeting during your tenure as Associate Administrator added a certain poignancy to the occasion. SScAC congratulates you on the many successes OSS and NASA have enjoyed as a result of your efforts. As I said in my opening remarks, you have changed the face of Space Science in the Agency and in the country, and are leaving a wonderful legacy for your successor. We are all very grateful.

With best personal regards,

Anneila I. Sargent
Chair, Space Science Advisory Committee

cc: Carrie Sorrels, Space Science Advisory Committee
Jeffrey Rosendhal, Space Science Advisory Committee

SPACE SCIENCE AND APPLICATIONS ADVISORY COMMITTEE
NASA Headquarters, MIC 6
July 29-31, 1998

LIST OF PRESENTATION MATERIAL[1]

1) Space Science Enterprise [Huntress]
2) Suggestions for Restructuring the Space Science R&A Program [Huntress]
3) Astrobiology Institute [McDonald]
4) Space Science Enterprise FY 00 GPRA Performance Plan [Allen]
5) SScAC R&A Task Force Report [Black]
6) A View from the Forums [Hawkins]
7) OSS Broker/Facilitators: A Progress Report to the SScAC [Black]
8) OSS Education and Outreach: A Progress Report [Rosendhal]
9) MO&DA Programs [Riegler]
10) Structure and Evolution of the Universe – Science Director's Report [Hertz]
11) SEU Recent Science Highlights [Blandford]
12) Solar System Exploration Update [Pilcher]
13) Solar System Exploration Subcommittee Report to SScAC [Squyres]
14) Origins Subcommittee [Black]
15) SECAS Report to Space Science Advisory Committee [Christensen]
16) NASA Detector Technology [Jhabvala]
17) Optical Communications for NASA Science Missions [Lesh]
18) Office of Space Science Technology Program Progress Report [Ulrich]
19) NASA Grants Management Process Team [Kicza]

Other material distributed at the meeting:

1) Advertisement—Director of NASA Astrobiology Institute, NASA Ames Research Center
2) *NASA Facts*: Space Science Education/Public Outreach
3) Final Report of the SScAC Task Force on R&A and MO&DA
4) Sensenbrenner/Brown letter to Mr. Goldin dated March 5, 1998, and response from E. Heffernan
5) Letter from Dr. Huntress to ARC Center Director re initial establishment of the NASA Astrobiology Institute

[1] Presentation and other material distributed at the meeting is on file at NASA Headquarters, Code S, Washington, DC 20546.